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July 11, 2000

Dr. Alvin Young, Director  
Center for Risk Excellence  
U.S. Department of Energy  
Chicago Operations Office  
9800 S. Cass Avenue, Building 201  
Argonne, IL 60439

Dear Dr. Young,

Enclosed please find the *National Health and Safety Risk Program Multiyear Program Plan, Fiscal Years 2001-2005*. This plan describes the activities of the DOE Center for Risk Excellence (CRE) in Chicago in support of national and site level environmental analysis, decision making, and communication as part of EM's integrated risk program. This plan is a "living" document that will be updated at least annually to reflect input from the DOE Headquarters and field personnel to address evolving risk issues and needs. In addition, it is expected that the plan will prove useful in guiding funding decisions as the national risk program moves forward.

As you know, this program plan reflects the contributions of a large number of individuals. We would like to express our appreciation for your valuable input and guidance on its development, as well as for the considerable contributions of other Center staff, notably Mr. Mark Bollinger and Mr. Peter Siebach. We would also like to acknowledge DOE Headquarters and field personnel for their feedback and significant contributions, including Mr. Mark Gilbertson, Mr. Joe LeTourneau, Mr. Randal Scott, Mr. Robert Goldsmith, and Mr. Douglas Hildebrand. Additional valuable input was provided by Ms. Kathie Reed and Ms. Susan Barisas, and by Mr. Bruce Church, Dr. Curtis Travis, Dr. Martin Edelson, Dr. Robert Stenner, Mr. William Andrews, Dr. Terry Sullivan, Mr. Wilson McGinn, and other members of the Center's team.

On behalf of the full team, thank you for the opportunity to develop this plan that is intended to help guide the Center's support of EM's risk program in the coming years. We look forward to continuing to work closely with the Center for Risk Excellence and the Department's Office of Environmental Management as the plan is implemented.

Sincerely,

Dr. Loren Habegger

Dr. Margaret MacDonell

Mr. Fred Monette

cc: w/o enclosure

A. Dvorak, ANL

**U.S. Department of Energy  
Office of Environmental Management**

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**National Health and Safety Risk Program  
Multiyear Program Plan  
Fiscal Years 2001 – 2005**

**July**

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*Prepared for:*

*U.S. Department of Energy  
Chicago Operations Office  
Center for Risk Excellence*

*U.S. Department of Energy  
Office of Environmental Management  
Office of Safety, Health and Security*

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**U.S. Department of Energy  
Office of Environmental Management**

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**National Health and Safety Risk Program  
Multiyear Program Plan  
Fiscal Years 2001 – 2005**

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*Prepared by:*

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If you have questions or would like assistance with risk management, risk assessment, or risk communication issues, please contact the DOE Center for Risk Excellence by visiting our web site at <http://riskcenter.doe.gov> or by calling (888) DOE-RISK (888-363-7475).

## CONTENTS

1	INTRODUCTION .....	1
2	PROGRAM STRUCTURE.....	3
3	NATIONAL RISK PROGRAM ACTIVITIES .....	4
3.1	Risk Integration.....	5
3.2	Standards and Cleanup Criteria .....	6
3.3	Long-Term Stewardship/Residual Risk .....	7
3.4	Risk Interface with Science and Technology Development .....	7
4	KEY ACTIVITIES ONGOING IN FY 2000 .....	8
5	INTERNATIONAL INITIATIVES .....	10
6	RISK PROGRAM ACTIVITIES PLANNED FOR FY 2001 – 2005.....	11

## TABLES

6.1	RISK PROGRAM ACTIVITIES PLANNED FOR FY 2001 – 2005.....	11
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## FIGURES

1	SHUT-DOWN PLUTONIUM PRODUCTION REACTORS ALONG THE COLUMBIA RIVER AT THE HANFORD SITE .....	1
2	NATIONAL RISK PROGRAM SUPPORT TO INTEGRATED ENVIRONMENTAL DECISION-MAKING FRAMEWORK .....	2
3	RELATIONSHIPS BETWEEN THE NATIONAL RISK PROGRAM AND OTHER PROGRAMS AND ORGANIZATIONS .....	3
4	OVERVIEW OF MAJOR RISK PROGRAM ACTIVITIES .....	4
5	INTEGRATED RISK ASSESSMENT.....	5
6	DISTRIBUTION OF CESIUM-137 CLEANUP LEVEL GUIDELINES AT DOE SITES .....	7
7	HIGHLIGHTS OF SCIENTIFIC CHALLENGES FOR RISK ASSESSMENT .....	8



# 1 INTRODUCTION

The U.S. Department of Energy (DOE) Strategic Goal for Environmental Quality is to aggressively clean up the environmental legacy of nuclear weapons and civilian nuclear research and development programs, minimize future waste generation, safely manage nuclear materials, and permanently dispose of the nation's radioactive wastes while maintaining a safe working environment.

Selecting a path for the DOE Environmental Management (EM) Program to best pursue this goal remains a challenging task, given the complex set of interrelated technological, legal, economic, social, and political issues involved. The health and safety of workers and the public must be of the highest priority within each strategy. New science and technology developments can benefit the Program and must be aggressively pursued. Strategies will not be successful unless the concerns of affected parties — Federal and State oversight agencies, Tribal nations, Congress, industry, academic and research institutions, local community groups, and the general public — are addressed.

The wide variety and scope of hazards and risks at EM cleanup sites, such as those shown at the Hanford site in Figure 1, have led to the need for a more integrated environmental decision-making framework that considers health and environmental risk as a primary focal point. Figure 2 shows the risk elements of such an integrated framework. An initial Needs Analysis phase defines the environmental management problem within a broader context by using approaches such as comparative risk screening. This phase also involves setting risk-related goals and conducting a preliminary analysis of options for achieving those goals. In the second phase, Analysis and Decision Support, a more detailed assessment of the multiple risks and options is conducted to identify the most appropriate control strategies. In the



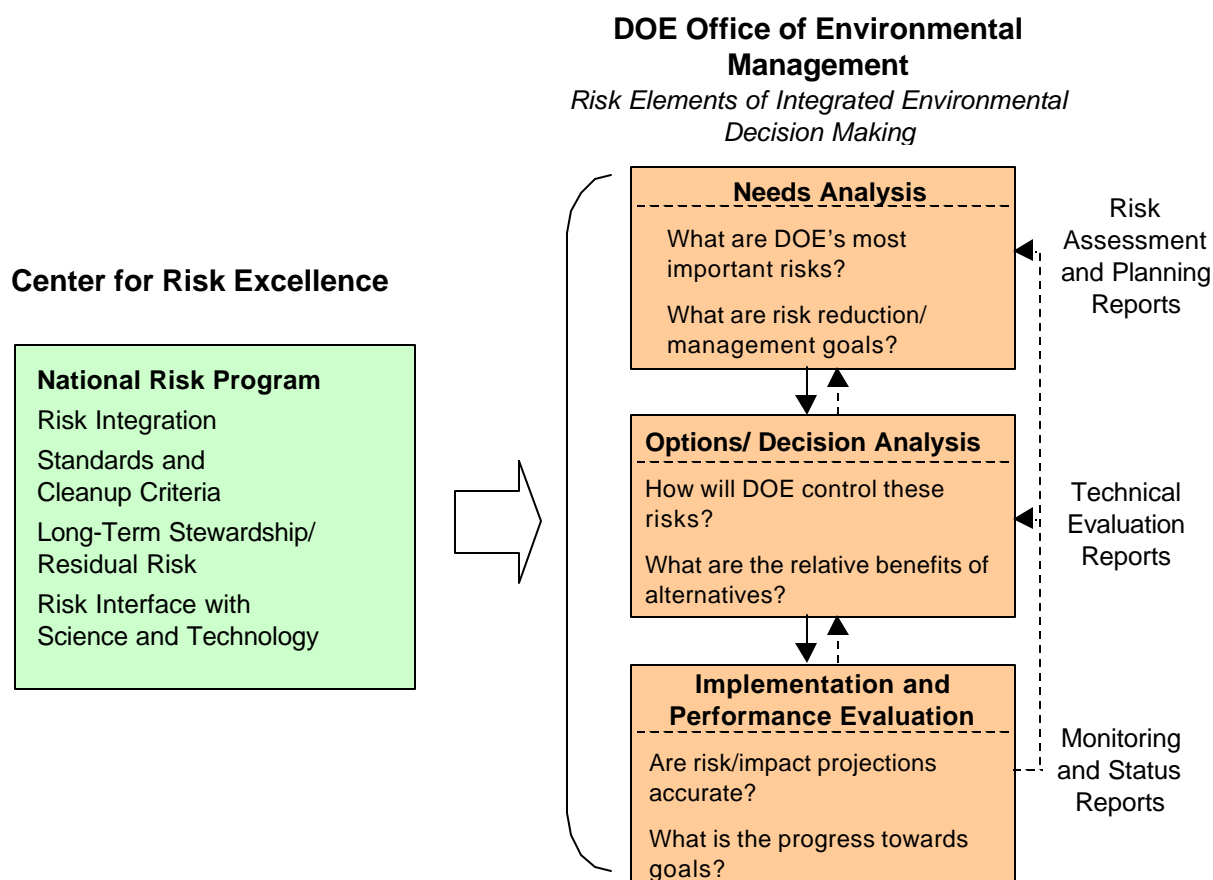
**FIGURE 1 Shut-down Plutonium Production Reactors along the Columbia River at the Hanford Site (challenges at the site include decontamination and decommissioning of facilities, treatment of high-level radioactive waste stored in aging tanks, and cleanup of contaminated soil and groundwater)**



Implementation and Performance Evaluation phase, the selected strategy is implemented and a program for monitoring and evaluating performance is established. The results of the monitoring and performance evaluation are used to update risk assessments and to adjust the control strategies. Each phase of the framework is conducted in collaboration with affected parties.

This Multiyear Program Plan for a National Risk Program describes how the DOE Center for Risk Excellence (CRE) in Chicago supports national and site-level environmental analysis, decision-making, and communication activities as part of EM's integrated risk program. The EM program needs credible risk information from a variety of sources to (1) assist with planning and prioritization of EM activities, including waste and nuclear materials management and cleanup programs; (2) provide a baseline for determining progress; (3) measure and improve worker and public health and safety; and (4) establish a basis for meaningful dialogue with the public.

This Plan will be updated annually on the basis of input from interested parties and from responses to discussion documents developed annually by the CRE in response to new and evolving issues.



**FIGURE 2 National Risk Program Support to Integrated Environmental Decision-Making Framework**

## 2 PROGRAM STRUCTURE

The DOE Center for Risk Excellence (CRE), located in the DOE Chicago Operations Office, is sponsored by the Office of Safety, Health and Security (EM-5). The CRE was established in 1997 to serve as a catalyst for improved environmental decisions through sound risk assessment, management, and communication. It supports both Field and Headquarters' organizational units. As illustrated in Figure 3, other key participants in the National Risk Program include the DOE Operations/Field Offices, including the Board of Directors for the CRE; DOE National Laboratories; Grant and Cooperative Agreement institutions,<sup>1</sup> Management and Integration Contractors; and technical experts from academic and research organizations and the private sector. As the EM lead for risk, the CRE has a principal responsibility for facilitating participation and interactions among these entities to address the risk component of DOE's environmental quality goals. This responsibility includes coordinating multiple activities of the National Risk Program, as summarized below and further described in Table 6.1.



**FIGURE 3 Relationships between the National Risk Program and Other Programs and**

<sup>1</sup> Key organizations currently supporting the National Risk Program include the Medical University of South Carolina (MUSC); the Consortium for Risk Evaluation with Stakeholder Participation (CRESP), which primarily involves Rutgers University and the University of Washington; and the Nevada Risk Assessment Management Program (NRAMP). A primary aim of these cooperative agreements is to provide a mechanism for obtaining neutral, independent input on risk issues important to EM.

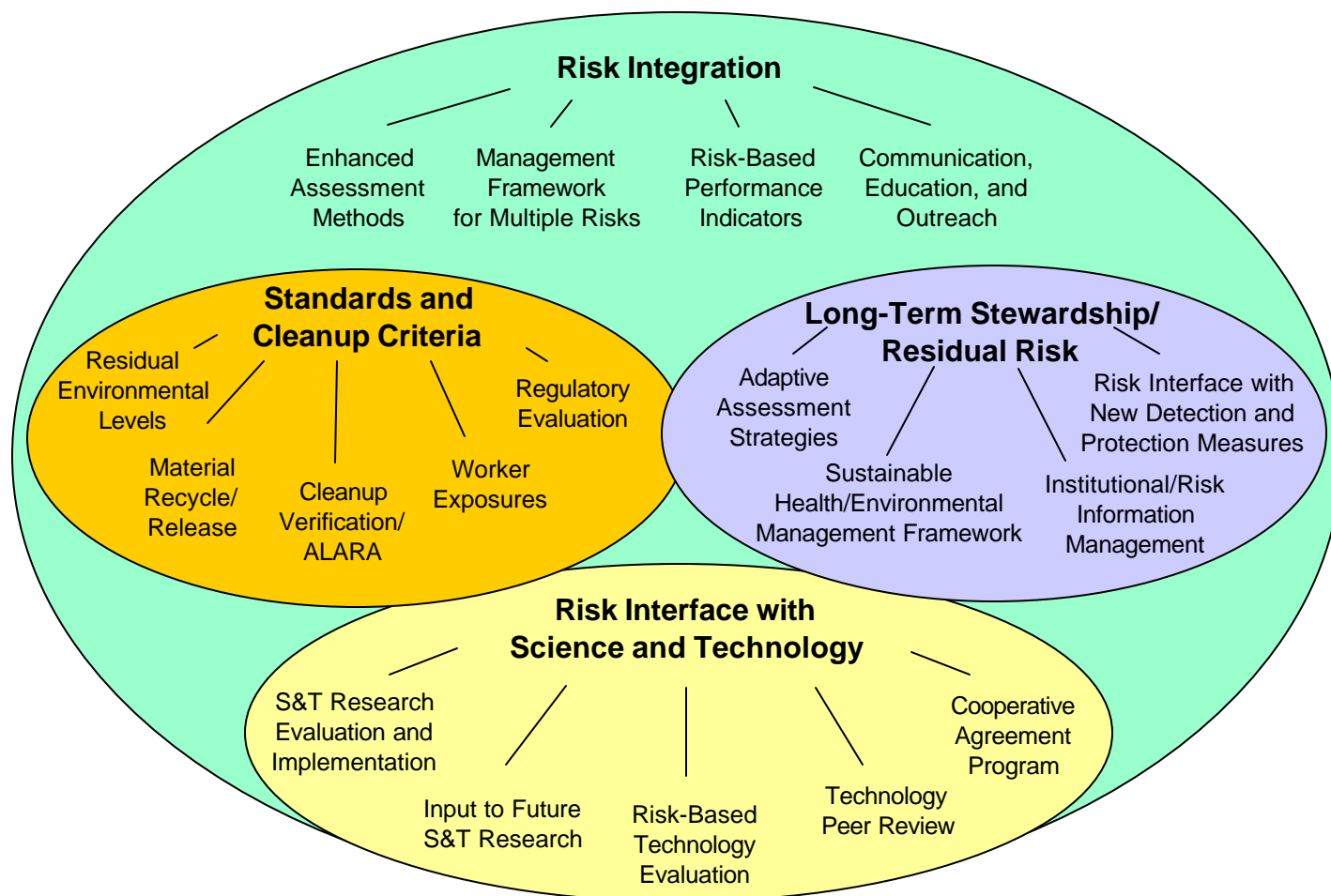
### Organizations

EM-5 is responsible for program overview and evaluation, policy development, and technical support and assistance in the areas of Safety and Health, Safeguards and Security, and Quality Assurance within EM. The primary objective of the Office is to instill in all EM personnel an instinctive appreciation for their responsibilities in the areas of safety, security, and quality so that these concepts are integral to all EM programs and activities. Because of the inherent relationship between risk and safety and health issues, EM-5 became the sponsor of the CRE in fiscal year (FY) 2000.

Prior to FY 2000, the CRE's DOE/HQ sponsoring organization was the Office of Science and Technology (EM-50). The CRE is maintaining its relationship with EM-50 and essentially serves as an informal "Cross-Cut Area." It provides the necessary support to the EM-50 focus areas on an ad hoc basis, including providing input to the planning and evaluation of the EM Science Program.

## 3 NATIONAL RISK PROGRAM ACTIVITIES

The National Risk Program has been organized within four primary categories to most directly address the needs of integrated environmental decision making: (1) Risk Integration (to include public and worker health and safety, ecological risk, and many other types of risk), (2) Standards and Cleanup Criteria, (3) Long-Term Stewardship/Residual Risk, and (4) Risk Interface with Science and Technology Development. As shown in Figure 4 and described below, Risk Integration is an overarching category that extends across risk assessment, risk management, risk communication, and risk policy; the other three categories are major component areas that provide additional focus for program activities.

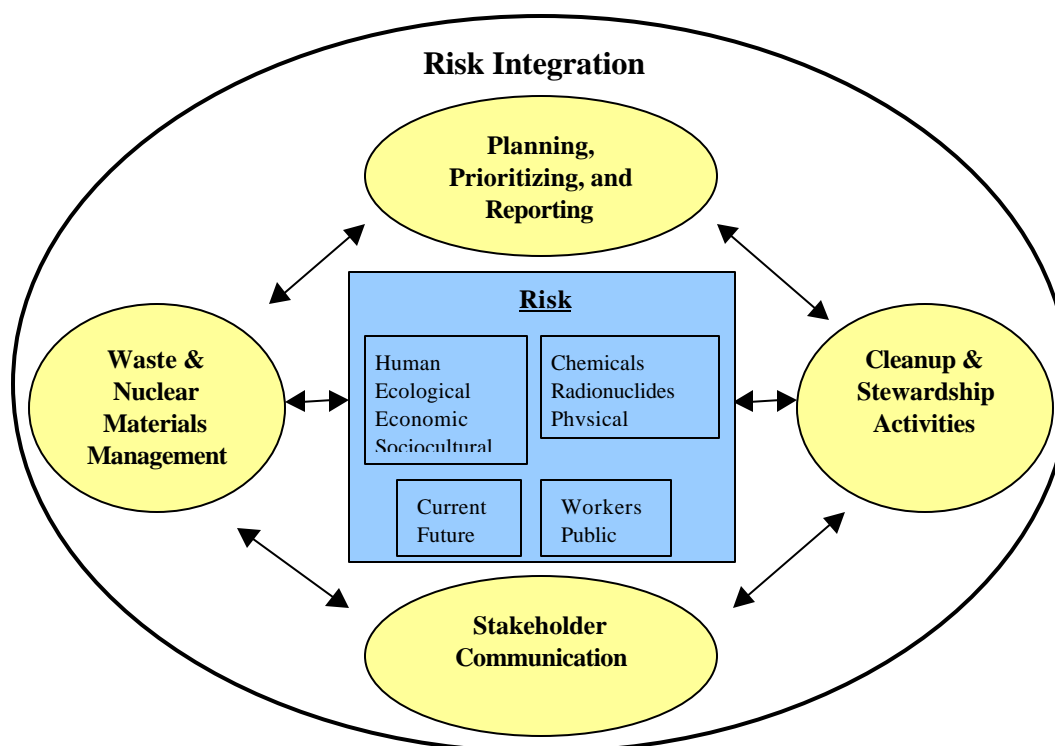


**FIGURE 4 Overview of Major Risk Program Activities**

Sections 3.1 through 3.4 describe National Risk Program activities within the context of the integrated environmental decision-making framework. Descriptions of specific activities are given in Table 6.1.

### 3.1 Risk Integration

The integration of risk information and issues into DOE planning and decision making and the integration of program activities across various projects and sites are critical to the credibility and accountability of the EM program. As shown in Figure 5, risk integration involves assessing multiple types of risks over different locations and time periods; managing risks associated with operations, cleanup, and long-term stewardship; making planning decisions; and communicating with and involving affected parties throughout the process.

**FIGURE 5 Integrated Risk Assessment**

*Enhanced Assessment Methods.* Risk assessments are conducted at facility/project, site, and complex-wide levels to identify hazards and possible impacts. Clear analysis of potential impacts associated with current conditions and operational alternatives is important for decision makers responsible for reducing cost and accelerating cleanup while maintaining safe operations. Because of the many types of hazards and risks, the extensive spatial and time scales over which they must be assessed, and the sequencing of numerous projects within and among sites, sound assessments are essential to an effective environmental management program. Further, improved methods for integrating diverse assessments into

a comprehensive overview of the risk picture for each site will support better evaluation of control strategies and of progress in managing hazards and risks over time.

*Management Framework for Multiple Risks.* Risk is a critical element of EM decisions at the facility/project, site, and complex-wide levels. Integrating multiple risk data with other decision criteria, including cost and schedule, is important to a sound program. Risk-informed decisions based on strong scientific information will help ensure the safety of workers and the public and increase their confidence in the DOE program. In making decisions about a specific problem at a given site, many administrative and engineering response options may be evaluated, ranging from no active remediation with institutional controls, to in-place containment or removal and disposal off site. These evaluations warrant careful consideration of many decision factors, including feasibility, ability to minimize net risks, and cost effectiveness. The Department can benefit from improved methods and tools for incorporating risk information into critical decision processes such as prioritizing and sequencing EM activities, selecting and implementing specific response measures, and determining the levels of residual contamination appropriate for a given site.

*Communication, Education, and Outreach.* Actively involving interested parties in the process of evaluating hazards and risks and helping internal and external stakeholders to understand how to interpret technical risk information are both critical to the success of the EM program. While the Department has made a number of recent advances in using and communicating risk information, significant opportunities exist for DOE to enhance its program effectiveness and public confidence through the improved use of risk information. Sound, credible information about the hazards and risks at each site; the measures being applied to control these hazards and risks to safe and acceptable levels; the progress being made at the local and national levels; and effectively communicating this risk information are important to external acceptance of the DOE program. Working in close coordination with interested parties to support open, regular, two-way communication between internal and external stakeholders and to provide opportunities for capacity building through training, educational materials, and outreach programs is a vital element of the National Risk Program.

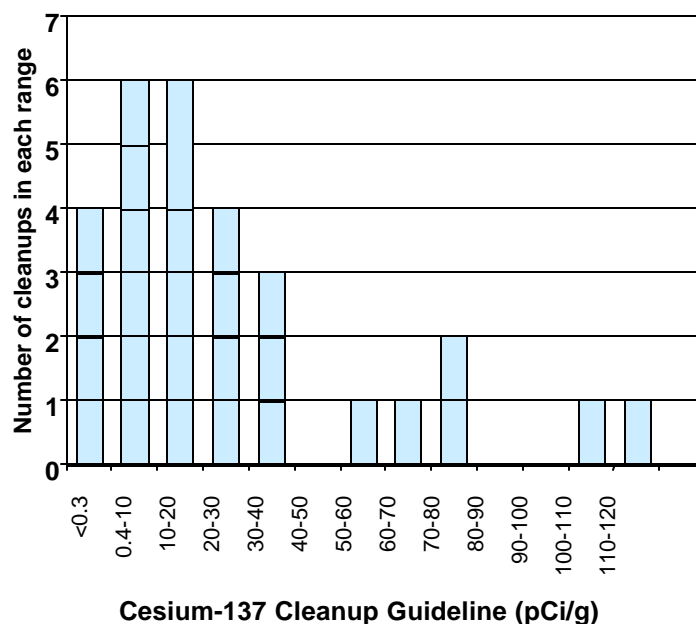
*Risk-Based Performance Indicators.* In addition to DOE program managers, many external parties are keenly interested in tracking the progress of DOE's environmental cleanup and management activities, including oversight agencies and Congressional, environmental, and community stakeholder groups. It is important that the risk program continue to develop and refine risk-based cost/benefit methods and other approaches to demonstrate EM progress. Risk-based indicators should be transparent as to how they are generated, reported, and interpreted.

## **3.2 Standards and Cleanup Criteria**

An important part of the National Risk Program involves interpreting existing and evaluating proposed standards and guidelines, compiling and assessing cleanup criteria and associated risk data that have been established for DOE sites (as illustrated in Figure 6), evaluating potential recycle and release of slightly contaminated material, and appraising worker and public exposures and safety risks with regard to risk-based protective standards.

Determining scientifically based cleanup levels for contaminants in various media at DOE sites is crucial to setting sensible completion points for active remediation and transitioning to stewardship. Application of inappropriate standards can result in unnecessarily high EM costs; therefore, a balance must be struck between aiming toward very low residual levels to protect hypothetical future receptors and protecting remediation workers and environmental resources today and into the future. Sound science

and risk information is important for determining the appropriate levels of contamination that can remain in environmental media or materials released for other uses. An open dialogue is needed to improve communication among DOE and Federal and State agencies, industry, the scientific community, environmental groups, and the general public on related risk issues. Such issues include ongoing worker injuries and deaths resulting primarily from the physical aspects of cleanup actions that may be unwarranted from a risk perspective, considering our understanding of potential health effects at low levels of environmental exposure. Development of appropriate cleanup criteria that are based on the best available scientific information and that are relevant to site conditions, with explicit consideration given to both associated costs (including worker risk) and benefits, can significantly enhance the overall effectiveness of the EM program.



**FIGURE 6 Distribution of Cesium-137 Cleanup Level Guidelines at DOE Sites**

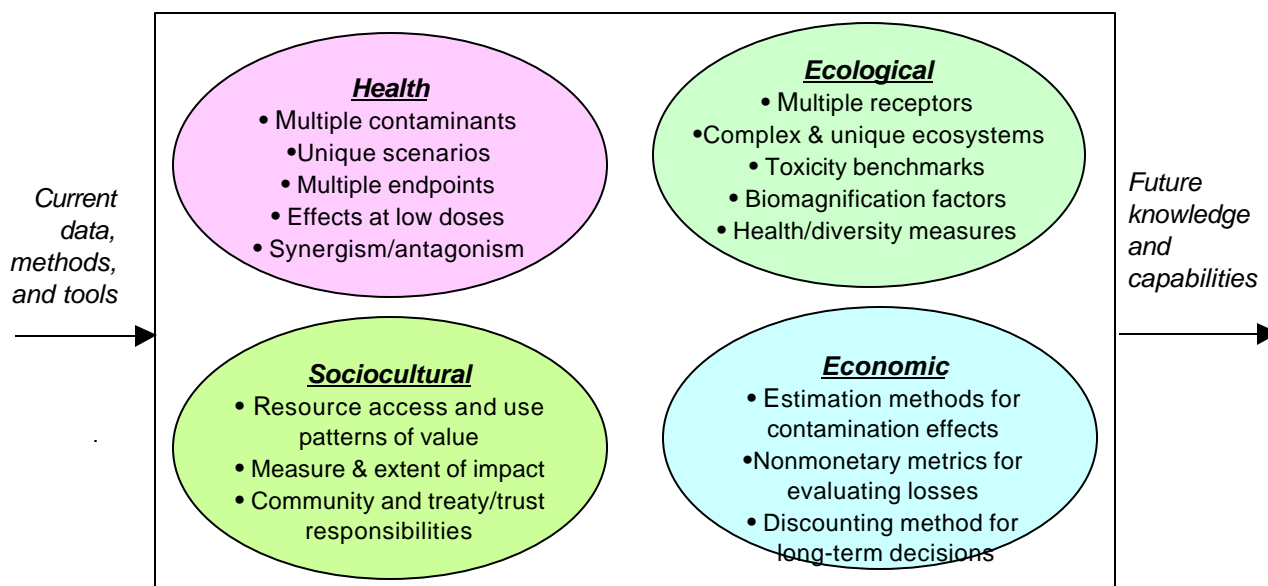
### 3.3 Long-Term Stewardship/Residual Risk

The continued protection of humans and the environment at EM sites for as long as hazards remain poses a major challenge for the Department. Residual risks must be managed to maintain safe conditions and to preserve valuable resources into the extended future. Significant returns on investment are possible through up-front risk management planning. Estimating long-term risks associated with contaminated materials to be left at a site is critical to developing future use options and to defining stewardship needs. Risk can be an important tool for developing a management framework that addresses sustainable health and environmental controls, for providing technical input to negotiations on future land use, for designing adaptive control strategies to guide program adjustments based on post-cleanup data, and for providing input to applied science and technology programs focused on long-term containment and monitoring systems.

### 3.4 Risk Interface with Science and Technology Development

Extensive research and development (R&D) activities have enabled the EM program to manage a

variety of materials and conditions at DOE sites, including subsurface contamination, high-level waste tanks, mixed waste, decontamination and decommissioning (D&D) of facilities, nuclear materials, and spent nuclear fuel. However, knowledge gaps still exist. Filling critical gaps and addressing uncertainties through science and technology (S&T) will help increase efficiency (cost and schedule) and enhance the long-term effectiveness of the integrated environmental management program. All of DOE's S&T programs have a risk component. As illustrated in Figure 7, key risk challenges for the



**FIGURE 7 Highlights of Scientific Challenges for Risk Assessment**

Department's S&T program include (1) continuing the critical evaluation of research gaps that focus on risk issues for the EM program, which involves close coordination between researchers and the information users; (2) targeting new scientific and technological advances that have the potential to mitigate risk; (3) facilitating a stronger, more timely link between research results and field application; and (4) partnering with other programs, agencies, and industry to solve common problems. The National Risk Program also assists with the risk-based evaluation of technologies being developed and deployed, including coordination of a system of independent peer review.

#### **4 KEY ACTIVITIES ONGOING IN FY 2000**

As critical Departmental issues are identified, the CRE prepares formal discussion documents to analyze those issues from a risk perspective. The CRE is in the process of finalizing three crosscutting discussion documents intended to stimulate discussion within DOE and the scientific community in order to further focus National Risk Program activities. The three current discussion documents focus on (1) using risk-informed performance-based safety management to reduce worker risks and further improve the DOE safety record; (2) evaluating worker safety as an integral and necessary component of technology selection and development; and (3) examining and evaluating the rationale for developing and establishing cleanup criteria and making cleanup decisions at contaminated sites. It is anticipated that these discussion

documents will be “living” documents that will be revised and expanded to reflect input from DOE and the stakeholder community and changing needs and issues. As such, the discussion documents will be a primary means of soliciting feedback on National Risk Program activities; therefore, this Plan will be revised and updated as necessary.

In addition to the discussion documents, the National Risk Program is moving forward in each of its four major goal areas during FY 2000 with the following activities:

### **Risk Integration**

- Providing technical integration support to the Hanford Groundwater/Vadose Zone Integration Project, including development of a framework for improving the consistency and credibility of risk and impact assessments across material types, locations, and time periods, building from the CRE’s “Risk/Impact Technical Report for the Hanford Groundwater/Vadose Zone Integration
- Continuing to enhance site-specific hazard and risk information for each of the 10 major DOE Operations Sites to increase broad understanding of the EM risk management program and to provide a mechanism for communicating progress to and soliciting input from multiple interested parties.
- Continuing development of a Resource Handbook on DOE Transportation Risk Assessment in coordination with the DOE National Transportation Program for use across the Department, including finalizing a pilot application dealing with low-level waste transportation to Nevada.
- Developing targeted information briefs, such as on the release of minimally contaminated materials, general plutonium risk information, and D&D risk issues, as a means of enhancing communication on key DOE risk issues.
- Continuing to facilitate the sharing of information on key risk issues within and beyond the Department by publishing *Risk Excellence Notes*, including special issues devoted to key Departmental issues and concerns.
- Continuing to develop risk information for integration into DOE’s Environmental Management *Paths To Closure* plan and its associated databases.
- Providing training on integrated health and ecological risks and on transportation risk.
- Supporting initial development of the “National Environmental Pathway Database.”
- Reviewing historical safety data for workers to help focus risk reduction programs.
- Evaluating, from a risk perspective, opportunities for making environmental management programs more efficient.

### **Standards and Cleanup Criteria**

- Managing the “Cleanup Criteria Decision Document (C2D2) Database,” including extending the C2D2 data and preparing interpretive fact sheets based on the database contents.
- Outlining a plan for developing and demonstrating approaches that will help define cleanup decisions that are based on sound science rather than on perception, including identifying target



levels for residual contamination that better incorporate current scientific knowledge.

### **Long-Term Stewardship/Residual Risk**

- Distributing the CRE-sponsored report on “Risk Management Issues in Site Stewardship.”
- Contributing to the DOE National Stewardship Working Group activities.

### **Risk Interface with Science and Technology Development**

- Serving as the national peer review coordinator for EM’s Office of Science and Technology by coordinating American Society of Mechanical Engineers (ASME) peer reviews of 51 environmental technologies.
- Developing a methodology for using worker risk as a factor in technology evaluation.
- Enhancing the “Triage Process” for establishing priorities for peer review in support of EM Technology Development Focus Area managers.
- Continuing an internship program involving numerous graduate and undergraduate interns in ongoing science and technology assessment activities that cut across each of the CRE’s four emphasis areas in support of EM.
- Managing cooperative agreements with academia.

## **5 INTERNATIONAL INITIATIVES**

In addition to those ongoing activities described in Section 4, the CRE is involved in several risk initiatives, primarily in the international arena.

**International Risk Network.** Since the end of the Cold War, there is a growing recognition of the need for the networking of information and expertise to facilitate the use of risk in resolving issues associated with the cleanup of the Cold War legacy waste, particularly with and among eastern European nations. Toward this end, the CRE has been at the center of the effort to establish the *RISK ASSESSMENT NETWORK for COLD WAR FACILITIES and ENVIRONMENTAL LEGACIES*. To establish this Network, a Memorandum was signed by risk experts from the United States, Russia, and 11 other countries in May of 2000 that identifies the following 3 activities as key objectives:

1. The exchange, management and distribution of information on risk assessment, risk management and risk communication supporting health, safety and environmental protection;
2. The facilitation of scientific collaboration to include the determination of common technical/scientific problems, the sharing of appropriate scientific expertise, and the identification of potential sources of funding for this collaboration; and
3. The establishment of a unique program on training and exchanging students from 13 countries

in the disciplines critical to the science and application of risk.

**Arctic Military Environmental Cooperation.** Currently, the DOE and Department of Defense are jointly working with the Russian government in a project called the Arctic Military Environmental Cooperation (AMEC) forum. AMEC project areas include naval spent nuclear fuel management, naval liquid radioactive waste treatment, technology for solid radioactive waste reduction, solid radioactive waste storage technologies, radiation monitoring, personnel and environmental safety, technologies for remediation of hazardous wastes on Arctic military bases, and “clean ship” technologies. The CRE will provide support to the AMEC in the areas of risk assessment, management, and communication.

## 6 RISK PROGRAM ACTIVITIES PLANNED FOR FY 2001-2005

Table 6.1 provides information on activities planned for FY 2001 through 2005 for the four major task areas. Specific information reported for the output/product (which focuses on FY 2001, with similar expectations for further products in subsequent years) and the anticipated outcome and value of planned activities will serve as a basis for evaluating program performance. Specific projects and activities will be identified annually and documented in the CRE's formal Business Plan.

**Table 6.1 Risk Program Activities Planned for FY 2001 – 2005**

Activity/Description
<i>I. Risk Integration</i>
<b>a. Enhanced Assessment Methods</b>
<i>Methods for Specific Risk Types.</i> Refine and apply approaches for assessing specific risks and trade-offs among risks for targeted DOE applications, including the following:
- <i>Worker Health and Safety Risk.</i> Enhance existing approaches, considering exposure and safety issues per evolving requirements and guidelines for worker protection (including Integrated Safety Management), field data, historical data, and emerging toxicity data on the underlying mechanisms for estimating exposure/effect, e.g., acute and chronic toxicity and biomarker studies.
- <i>Ecological Risk.</i> Refine and enhance existing methods, addressing multiple biological levels and time and spatial scales; provide input to the evolving requirements and guidelines of other agencies.
- <i>Transportation Risk.</i> Enhance the transportation resource handbook per new information, including that from a pilot assessment conducted to illustrate implementation and provide proof-of-principle for the handbook.
- <i>Chemical Mixtures Risk.</i> Compile bibliographical, toxicological, and epidemiological data for selected mixtures, and test risk assessment approaches with a specific DOE case study.
- <i>D&amp;D Risk.</i> Enhance methods for assessing risks associated with contaminated facilities and the relative risk / cost of alternative D&D technologies.
- <i>Economic and Sociocultural Risk.</i> Compile and refine existing methods (including supporting development of a "quality of life" framework through the American Society for Testing and Materials [ASTM] initiative), considering specific community issues for DOE sites, including long-term stewardship.
- <i>Programmatic Risk.</i> Refine methods of addressing specific technical, work scope, intersite, interprogram, and other-agency factors, focusing on disposal and program integration/transfer issues.
- <i>Uncertainty Analysis.</i> Refine the assessment and expression of the wide variety of uncertainties, variabilities, and unknowns associated with hazards and risks at the site-specific and national program level, considering probabilistic methods and sensitivity analyses and incorporating new S&T data as they become available.
<i>Integrated Risk Assessment.</i> Develop and apply methods of assessing risks and related uncertainties within an integrated framework for multiple types of receptors and resources affected by radioactive and chemical contamination extending over large areas and long time periods.
<i>State-of-the-Art Assessment Practices.</i> Compile established and innovative practices of other programs and agencies (including international organizations) and identify best-in-class discipline-specific and integrated risk assessment methods and tools with applicability or relevance to DOE environmental management issues.
<i>Site-Specific Technical Assistance.</i> Provide technical risk assessment support to sites and program offices, as requested.

Activity/Description
<p><b>b. Management Framework for Multiple Risks</b></p> <p>Develop and apply approaches for integrating information on different kinds of risks and effects (see I.a) to support environmental management decisions, including for the following targeted applications.</p>
<p><i>Groundwater/Vadose Zone Analyses.</i> Develop strategies for using risk information to guide the selection of appropriate options for managing contaminated sources and underlying soil and groundwater, to include uncertainty management, for the near term and into the long term.</p>
<p><i>Vulnerability Analyses and Trade-off Studies.</i> Evaluate trade-offs associated with various waste and nuclear materials management control and configuration options to address common hazards and risks under current and predicted conditions, including programmatic issues such as budget and contingency planning.</p>
<p><i>Risk Analyses for DNFSB Recommendations.</i> Provide technical risk support to the Field and Headquarters to address Defense Nuclear Facilities Safety Board (DNFSB) recommendations regarding management of nuclear materials and disposal of low-level waste, including performance assessments and composite analyses.</p>
<p><i>Risk Management Compendium.</i> Evaluate, compile, and interpret for relevance to the environmental management program a variety of decisions – including site cleanup and facility D&amp;D and recycle/reuse decisions by DOE and other agencies (including the Department of Defense [DoD] and the U.S. Nuclear Regulatory Commission [NRC]), brownfield projects, and international cleanups – to summarize how risk information has been incorporated into those decisions and to identify related benefits.</p>
<p><b>c. Risk-Based Performance Indicators</b></p> <p>Develop risk-based metrics for indicating progress for the environmental management program, e.g., considering reduction in risk or maintaining current low risk levels at reasonable cost into the long term, through refining cost/benefit analysis approaches and other methods.</p>
<p><b>d. Communication, Education, and Outreach</b></p> <p>Further develop and implement communication tools to enhance the program's risk resource services, assimilating and disseminating information among interested parties, including through the following.</p> <p><i>Site-Specific Risk Information.</i> Information on public and worker health and safety, ecological risks, and other risk types (such as programmatic and sociocultural), as well as methods for measuring progress in risk reduction over time, will continue to be developed in coordination with sites to address their multiple stakeholder needs (e.g., through preparation of guidance and input to text for capturing risk information in programmatic documents such as <i>Paths to Closure</i>).</p> <p><i>Risk Excellence Notes.</i> Prepare and disseminate the CRE newsletter (including electronically), with contributions from multiple stakeholders.</p> <p><i>CRE and Other Web Sites.</i> Maintain and enhance the CRE and other risk-related Web sites to facilitate real-time sharing of risk information among multiple internal and external parties.</p> <p><i>Spatial Analysis and Visualization Tools.</i> Develop and make available risk information such as geographical displays of national cancer risk by type and risk contours for various exposure scenarios under different future land use options, considering locations of contaminants and habitats and other risk-influencing factors.</p> <p><i>Risk Training Materials and Workshops.</i> Develop and present training materials, in workshops and hard copy/electronically, on methods and tools for risk analysis (assessment, management, and communication). Presentations will be tailored to meet the needs of specific audiences, including project managers, assessors, communicators, site-specific advisory boards, Tribal members, and members of the local community (e.g., to support transition and implementation of stewardship activities).</p>

Activity/Description
<i>Information Briefs.</i> Develop a framework for producing targeted information briefs as a means of enhancing communication on key DOE risk issues.
<i>Academia, Agency, and Tribal Outreach Initiatives.</i> Develop and implement academic, agency, and Tribal educational outreach initiatives, such as facilitated student internships, faculty and curriculum development programs, and natural resource management planning programs. Participate in the development of national/international risk conferences.
<i>II. Standards and Cleanup Criteria</i>
<p><b>a. Residual Environmental Levels</b></p> <p>Compile data on cleanup criteria and residual risks as they are identified for individual DOE areas or sites (e.g., in Records of Decision), evaluate these data for influencing factors and trends, and maintain this information in a broadly available database through a Web application. Evaluate residual levels both for environmental media (e.g., soil and groundwater) and for other solids (e.g., debris).</p>
<p><b>b. Material Recycle / Release</b></p> <p>Refine a framework for assessing and releasing slightly radioactively contaminated material for disposal in non-radiological facilities (or recycle/reuse) to support site-specific needs.</p>
<p><b>c. Cleanup Verification/ALARA</b></p> <p>Provide technical assistance to sites regarding risk analyses of cleanup levels achieved and demonstration of <i>as low as reasonably achievable</i> targets.</p>
<p><b>d. Worker Exposures</b></p> <p>Provide technical assistance to evaluate acute and chronic worker exposures per emerging toxicity data, in support of consistency of risk-based protective standards.</p>
<p><b>e. Regulatory Evaluation</b></p> <p>Provide technical support to sites and programs (in collaboration with EH) to evaluate and comment on proposed and promulgated environmental guidelines and standards (including those for radiation protection and managing mixed waste), to assess and plan for impacts to the environmental management program.</p>
<i>III. Long-Term Stewardship/Residual Risk</i>
<p><b>a. Adaptive Assessment Strategies</b></p> <p>Develop and refine approaches for updating risk assessments and monitoring programs conducted as part of the overall long-term protection plan at individual sites, per data to be collected over time.</p>
<p><b>b. Sustainable Health and Environmental Management Framework</b></p>
<p><i>Approaches for Addressing Residual Risks.</i> Develop methods for managing health and environmental risks over the long term through facilitated partnerships among multiple parties, including Field, Headquarters, and external groups. These approaches can be developed through interactive workshops and technical meetings.</p>
<p><i>Natural Resource Management Planning.</i> Develop and pilot the implementation of an approach to evaluate the current baseline and to manage natural resources for long-term sustainability at DOE sites as appropriate, working collaboratively through strategic partnerships (including with other Federal agencies, State and local natural resource and planning agencies, Tribal colleges and other academic institutions, and the private sector).</p>

Activity/Description
<b>c. Institutional/Risk Information Management Approaches</b>
<i>Long-Term Residual Risk Data Compilation and Evaluation.</i> Develop a framework for capturing estimated post-closure and long-term residual risk data and control measures as they are identified for individual areas or sites, in a manner that can be directly input to evolving future use and risk management plans.
<i>Technical Risk and Negotiation Support on Future Use.</i> Provide technical risk input to facilitate interactions among multiple interested parties regarding future use and long-term stewardship (including the Field and Headquarters, Federal and State oversight agencies, local agencies and industry, community organizations, and the general public), e.g., through working meetings and updated risk information on the CRE Web site.
<b>d. Interface with New Detection and Protection Measures</b>
In partnership with the Idaho National Engineering and Environmental Laboratory (INEEL) Long-Term Stewardship Science and Technology Program, provide technical risk input to applied science R&D aimed at improving the detection of environmental contamination and problems with waste control measures, and facilitate the transfer of research results to field implementation.
<i>IV. Risk Interface with Science and Technology Development</i>
<b>a. Risk-Based Technology Evaluation</b>
Work with the EM Office of Science and Technology Focus areas to evaluate developing and demonstration technologies, as well as technologies being deployed at full scale, using risk criteria. Refine and apply approaches for evaluating and selecting technologies to control and reduce risks at individual sites, including through decision analysis tools.
<b>b. S&amp;T Research Evaluation and Implementation</b>
<i>S&amp;T Research Application.</i> Evaluate and facilitate the transfer of DOE's risk-related S&T research results, including from the EM Science Program, through targeted dissemination and pilot implementation efforts.
<i>Evaluation of Risk R&amp;D Activities of Other Agencies and Organizations.</i> Evaluate data being generated by ongoing R&D activities from other organizations for applicability to EM needs and disseminate relevant information to potential users, e.g., through hard copy or electronic means and focused topical workshops.
<b>c. Input to S&amp;T Research</b>
Contribute technical input to needs-driven identification of S&T research programs, such as the EM Science Program, that focuses on risk issues.
<b>d. Technology Peer Review</b>
Coordinate independent peer reviews of planned and ongoing technology R&D, and ensure that appropriate summary reports are prepared.
<b>e. Cooperative Agreement Program</b>
Continue to support risk research of cooperative agreement organizations.
<i>V. International Initiatives</i>
<b>a. Risk Network</b>
Continue to support the establishment of the Network, focussing on the exchange of risk information, the facilitation of scientific collaboration, and the exchange of students in environmental disciplines.
<b>b. Arctic Military Environmental Cooperation (AMEC)</b>
Provide risk assessment, management, and communication support to the 7 AMEC project areas.

